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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|------------------------|-------------|----------------------|---------------------|------------------|
| 10/759,964 | 01/17/2004 | Cristian Wagner | (Z)98018CIP US | 1502 |
| 7590 | | 10/04/2005 | EXAMINER | |
| M. Robert Kestenbaum | | LUU, THANH X | | |
| 11011 Bermuda Dunes NE | | ART UNIT | | |
| Albuquerque, NM 87111 | | PAPER NUMBER | | |
| | | 2878 | | |

DATE MAILED: 10/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

EC

| | | | |
|------------------------------|-------------------------------|-------------------------------|--|
| Office Action Summary | Application No. 10/759,964 | Applicant(s) WAGNER ET AL. | |
| | Examiner Thanh X. Luu | Art Unit 2878 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 18 and 33 is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4-11, 13-17, 19-24, 26-28, 30-32, 34 and 35 is/are rejected.
- 7) ☒ Claim(s) 3, 12, 25 and 29 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☒ Certified copies of the priority documents have been received in Application No. 09/931,908.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the optical element that is variable rotationally around the optical axis must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly

indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 2, 4, 6-8, 14-16, 19, 32 and 35 are rejected under 35 U.S.C. 102(b) as being anticipated by Schaffer, Jr et al. (U.S. Patent 4,993,813), hereinafter, Schaffer.

Regarding claims 1, 2, 4, 6-8, 14-16, 19, 32 and 35, Schaffer discloses (see Fig. 1) an apparatus comprising: at least one curved mirror (10) having an optical axis that is deformable, and adjusting elements (plurality of 16's), in which the adjusting elements comprise at least one actuator (one instance of 16), acting collectively upon at least two discrete contact places (two contact places of two elements 16) of the curved mirror that are arranged symmetrically to the optical axis of the curved mirror and with which astigmatism is corrected. Furthermore, "a catadioptric projection objective for microlithography" is disclosed since the same claimed structure is present in Schaffer. Schaffer also discloses (see Fig. 1) at least one sensor (camera 18) sensing a parameter of a projected image and a control system (20) that joins together the at least one sensor and the adjusting elements into a control circuit in which image errors are

minimized.

4. Claims 1, 2, 4-6, 8, 14, 19-21, 30 and 35 are rejected under 35 U.S.C. 102(b) as being anticipated by Spinhirne (U.S. Patent 4,393,303).

Regarding claims 1, 2, 4-6, 8, 14, 19 and 35, Spinhirne discloses (see Fig. 2) an apparatus comprising: at least one curved mirror (114) having an optical axis that is deformable, and adjusting elements (plurality of 130's), in which the adjusting elements comprise at least one actuator (one instance of 130), acting collectively upon at least two discrete contact places (two contact places of two elements 130) of the curved mirror that are arranged symmetrically (see Fig. 3) to the optical axis of the curved mirror and with which astigmatism is corrected. Furthermore, "a catadioptric projection objective for microlithography" is disclosed since the same claimed structure is present in Spinhirne. Spinhirne also discloses (see Fig. 2) at least one sensor (119) sensing a parameter (wavefront) of a projected image and a control system (20) that joins together the at least one sensor and the adjusting elements into a control circuit in which image errors are minimized. Spinhirne also discloses (see Fig. 3) a second sensor (120) sensing an irradiation quantity as claimed.

Regarding claim 20, 21 and 30, Spinhirne discloses (see Fig. 2) an operating process, comprising: deforming the curved mirror (114) by actuators (130) at three pairs of action places (see Fig. 3). Imaging quality is inherently increased since the same claimed method step is carried out. Spinhirne also discloses (see Fig. 2) matching and correcting for image errors.

5. Claims 15-17, 31, 32 and 34 are rejected under 35 U.S.C. 102(b) as being

anticipated by Humphrey (U.S. Patent 4,043,644).

Regarding claims 15-17 and 32, Humphrey discloses (see Figs. 3 and 4) a device, comprising: at least one curved mirror (A) that is deformable, which deformability of the curved mirror includes shapes of the curved mirror with at least fourfold rotational symmetry; and at least one actuator (45, 46) for deformation of the curved mirror being matched to the shape and symmetry of specific deformations of the curved mirror. Humphrey also discloses (see Figs. 3 and 4) the rotational symmetry of the mirror and gradient as claimed. Further, Humphrey discloses (see Figs. 3 and 4) four action places (57) as claimed.

Regarding claims 31 and 34, Humphrey discloses (see Figs. 3 and 4) a device, comprising: at least one curved mirror (A) that is deformable, adjusting elements (41, 42) that deform the curved mirror; and an additional adjusting element with an actuator (45, 46) with a bridging part (B) with four discrete contact places (57) on the curved mirror that are arranged in fourfold symmetry to the optical axis. Since the claimed structure is disclosed, the device is adapted to correct for imaging error.

6. Claims 1, 2 and 9-11, are rejected under 35 U.S.C. 102(e) as being anticipated by Endou (U.S. Patent 5,963,374).

Regarding claims 1, 2 and 9-11, Endou discloses (see Fig. 8) an apparatus comprising: at least one curved mirror (11) having an optical axis that is deformable, and adjusting elements (17, 21), in which the adjusting elements comprise at least one actuator (17), acting collectively upon at least two discrete contact places of the curved mirror that are arranged symmetrically to the optical axis of the curved mirror.

Astigmatism is inherently corrected since Endou discloses the same claimed structure. Furthermore, "a catadioptric projection objective for microlithography" is disclosed since the same claimed structure is present in Endou. Endou further discloses (see Fig. 11) at least one optical element (9) that is variable in position axially.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schaffer.

Regarding claim 9, Schaffer discloses the claimed invention as set forth above. Schaffer does not specifically disclose at least one optical element that is variable in position. However, Schaffer further teaches (see Fig. 3) a telescope system. Furthermore, telescopes are notoriously well known to be able to be variable in position. Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide at least one optical element (e.g. telescope lenses) of Schaffer for target tracking.

9. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Endou.

Regarding claim 13, Endou discloses the claimed invention as set forth above. Endou does not specifically disclose at least one optical element that is variable rotationally as claimed. However, providing focusing control via a rotational optical element is well known. Thus, it would have been obvious to a person of ordinary skill in

the art at the time the invention was made to provide at least one optical element variable rotationally as claimed in the apparatus of Endou as desired for finer focusing.

10. Claims 20-24, 26-28 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Unno (U.S. Patent 5,805,273) in view of Koyama et al. (U.S. Patent 5,793,473).

Regarding claim 20-24, 26-28 and 30, Unno discloses (see Figs.) an operating process that increases imaging quality of a microlithographic projection exposure device with a catadioptric objective with at last one curved mirror, comprising: deforming the curved mirror (see col. 19, lines 1-7) by an actuator. Unno further disclose sensing operational parameters (wavefront or astigmatism) and deforming the mirror based on the sensing as claimed. Unno also discloses (see Figs.) moving a lens or a mask or a wafer as claimed. Unno does not specifically disclose using a plurality of actuators. Koyama et al. teach (see Fig. 2) deforming a mirror in a projection exposure device using actuators (9A-9E). Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a plurality of actuators in the method of Unno in view of Koyama et al. to carry out more complex deformations and improve correction.

Allowable Subject Matter

11. Claims 18 and 33 are allowed over the prior art of record.

12. Claims 3, 12, 25 and 29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13. The following is a statement of reasons for the indication of allowable subject matter: an catadioptric projection objective for microlithography as claimed, more specifically in combination with actuating four places synchronously pairwise and having two of the places arranged in twofold symmetry; or having an additional adjusting element with an actuator with a bridging part with four contact places arranged in fourfold symmetry; or having an optical element variable transversely; or sensing average transmission of the mask; or deforming the mirror to compensate for lens heating or compaction, is not disclosed or made obvious by the prior art of record.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh X. Luu whose telephone number is 571-272-2441. The examiner can normally be reached on M-F 6:30AM-4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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A handwritten signature in black ink, appearing to be 'M' followed by a long horizontal stroke.

Thanh X Luu
Primary Examiner
Art Unit 2878

10/2005